

These business units feel that it is necessary to spend from 1% to 4% of their total disbursements for research in order to keep up with the times and with competition. Relatively, our public unit, the State Highway Commission of Indiana, is spending less than 0.25% on the Joint Highway Research Project. The expenditure and size of the permanent staff seem quite small compared to those in private enterprise.

Now let us consider the second question, should the Joint Highway Research Project be located at Purdue? It might be urged that the Bureau of Materials and Tests at Indianapolis has a large, well-equipped laboratory available for such research. However, Purdue University makes no charge for laboratory facilities furnished to the project. Also available, without cost to the project, are the consulting services of Dean Potter, Professor Wiley, and other members of the various engineering faculties. It is believed that a more detached viewpoint can be maintained at Purdue. The Research Project is under less direct sales pressure from material and equipment representatives at Lafayette than if it were at Indianapolis. It is a great convenience for those of us at Indianapolis to be able to refer propositions of possible merit to a research laboratory at some distance for more leisurely consideration and study. The prestige of Purdue University is behind the findings of the project by reason of its location on the campus.

The third question, as to who gets the major benefits from the project, is of direct interest to this Road School audience. It is chiefly of benefit to county highway engineers and those of the State Highway Commission who are responsible for the moderate-cost types of construction and maintenance. Of the 23 separate research undertakings, only 2 or 3 are directly concerned with high-type construction. All others pertain to the use of low-cost materials—even to methods of utilizing local soils in such a way as to get the greatest structural strength possible from them.

In closing, it is desirable to point out that the results of the Joint Highway Research Project will be made available to all of you in the form of bulletins of the Engineering Experiment Station of Purdue University.

## THE HIGHWAY COMMISSION GOES TO TOWN

Hallie Myers,

Director of Traffic, State Highway Commission of Indiana,  
Indianapolis

In January, 1938, the highway commission “moved into town.” This was in compliance with an act of the 1937 Legislature charging the commission with maintenance, construction, and traffic control of its marked routes through all cities

and towns except Indianapolis. When we took down our signs at city limits reading, "State Maintenance Ends Here," we were immediately confronted with a host of new problems. For the past two years, we have been wrestling with the problems of traffic control on city streets, which are as different from rural traffic problems as day is from night.

We inherited approximately 400 miles of city streets, most of which needed resurfacing and were totally inadequate for modern traffic. Movement on these streets was complicated by hundreds of traffic signals of all types, some in the most surprising locations and most of them obsolete and in varying states of disrepair. Signs were not of uniform size, shape, color, or message; and traffic movement was hampered by regulations and ordinances of every conceivable kind. One city prohibited double parking; another permitted it for 10 minutes; one permitted speeds of only 10 m.p.h., while another permitted 30 m.p.h. One permitted "U" turns only at intersections, while the next permitted them only in mid-block. One permitted property owners to regulate parking in front of their property, while another permitted use of sidewalks for parking. Before this time, traffic on these streets, like Topsy, just grew, with little in the way of rational planning having been done since grandpa's day. Each town board or city council had imposed its own ideas of traffic control on all traffic entering the city or town, often without repealing conflicting ordinances. Practically all control measures had been undertaken without preliminary study to ascertain the facts, producing conditions in most cities and towns best described as "chaotic". This, then, was the problem we faced in January, 1938.

#### PROCEDURE

We set about at once to survey the situation, to determine what had to be done at once, and to do that first, leaving further refinements to wait until further study was possible. Our first task was to select routes and make a physical survey of them. Bad parking conditions producing congestion had to be cleared up; sight distance improved at intersections; the worst signals removed or modernized and new signs erected. This was done as rapidly as possible. New parking regulations were prepared for all cities. Then began the long, laborious process of providing for safe and orderly movements. Much of what we attempted was fought by local officials and organizations which objected to any change in their old established way of doing things and resented being told by anyone from the outside what could or could not be done in their city. Every step had to be carefully worked out and then sold to the local citizens, in order to secure some degree of public acceptance to changed conditions.

## THE THREE "E'S"

Engineering, Education, and Enforcement are three different, but associated, methods of approaching the problem:

Engineering to change physical conditions.

Education to change mental attitudes.

Enforcement to compel safe practices.

It is useless to argue about which is greatest. All three methods must be used. Engineering is the most effective over a period of years and the most expensive. Education is the most desirable and perhaps the least effective. Enforcement is always necessary to supplement the other two.

An ideal traffic facility in any city requires a wholesale program of construction and alteration that is hard to justify economically. Such a program cannot be undertaken at once, but we must in future improvement in cities give consideration to traffic needs. In the meantime, we must try to make the most valuable use of existing facilities. Often, minor structural improvements make these facilities more efficient. All street and highway users must also be made to realize that they have a personal responsibility in helping promote the safe and orderly use of these facilities.

City traffic is made up of three major elements: (1) Private motor vehicles. (2) Pedestrians. (3) Mass transportation. The greatest concentration of each of these is found at points of greatest business development, and their needs often conflict. Sound traffic planning recognizes the needs of each and works for the greatest good for the greatest number.

The major problems arising for us in city traffic control involve pedestrian protection, speed control, traffic signals, and parking. It seems that we are continually explaining our policies on these points. Many citizens in possession of only part of the facts and interested in only one side of the question form erroneous conclusions. Without waiting to hear the whole story or to determine whether the proposed change is desirable for the most people, they exert their American prerogative of assailing public officials in general and traffic men in particular.

## PEDESTRIAN PROTECTION

Pedestrian protection is more than a problem. It is a life's work. Since "going to town," the commission is finding this problem much more troublesome than on our rural highways. Over half the traffic fatalities in cities and towns are pedestrian fatalities. These are usually of the very young or the old, so the problem resolves itself into two divisions—protection for school children and adult protection. Most of our local demands are for school-child protection while going

to and from school. These petitioners either overlook or ignore the fact that the real pedestrian problem is the adult problem. There is no subject on which the Hoosier populace can get so thoroughly steamed up and hysterical as that of protecting children going to or from school. They envision thousands of helpless children, their own among them, being slaughtered on streets and highways, and demand action right now. Usually, the action demanded is a "stop and go" signal. Most of the unnecessary signal installations were prompted by this desire to protect children. However, facts prove that signals are not good protection for children, as they often disobey them or let them substitute for watchfulness. Of the three prevalent types of school-child protection, signals are a poor third in effectiveness.

We have devised a plan of school-child protection that has been quite successful. Since no motorist wants to hit a child, he must be given advance warning of the probable presence of children in the street. This, a signal does not give. The school child needs a definite place to cross, and since his attention is continually being claimed by a multitude of things, he needs someone to tell him when to cross. So, we provide pavement signs to warn motorists that they are approaching a crossing and paint crosswalks to tell children where to cross. We request schools to organize school-boy patrols to tell the children when to cross and to exercise enough control to insure that crossing will be made when and where indicated. Thus, it will be seen that school-child protection does not rest wholly on the state. It is rather a five-way responsibility, resting on state, pupil, parent, teacher, and motorist. Each must accept his fair share of the responsibility.



**Fig. 1. Temporary location of school crossing sign.**

In searching for facts, we find from National Safety Council surveys that, of all accidents to children of school age, 23.8% occur at home; 18.9% in the school buildings; 17.7% on the school grounds; 5.2% from motor-vehicle accidents on streets and highways, *not* during school movements; and 2.1% in motor-vehicle accidents while actually going to and from school. The school-child pedestrian is safer than any other group, perhaps safer than his parents and certainly much safer than when playing at home. The parent who fights for protection for his child on the way to school often reads his newspaper on the front porch while his children play in the street. If we are to advance the cause of safety, we must concentrate on those who need it. The children seem to have learned their safety lessons much better than their parents, most of whom offer very poor object lessons to their children.

Let's consider the adults. From the beginning of our traffic troubles, the pedestrian has been petted and pampered, while we have all taken a healthy swing at the motorist who is unlucky enough to hit him. We might begin at the other end of the problem. Pedestrians roam aimlessly all over our streets, disregarding any inconvenience to motorists or possible danger to themselves. There is no more reason why pedestrians should walk aimlessly in the street than there is for motorists to drive on the sidewalk. Each has a place set aside for his movement. At intersections, where their paths conflict, the motorist is taught to look for pedestrians and, in most cases, the pedestrian is given the right-of-way by law. Between intersections, the motorist has the right-of-way, and pedestrians should keep out of the street. Over half the pedestrian accidents are due to improper or unlawful acts of pedestrians themselves. Many old persons who grew up before the motor age still cling to horse-and-buggy habits of walking. Never having driven a motor car, they expect the driver to be able to stop on a dime. They resent anyone's telling them how to walk and where or when to cross the street, and kid themselves into believing that they are as agile as they were 30 or 40 years ago.

A good example of pedestrian performance in any Indiana city is taken from a recent traffic survey of Richmond where, out of a total of over 5,600 persons observed at traffic signals, 47.7% started to cross facing the green signal, 8.7% started on the amber, and 43.6% showed their independence by crossing on the red. This same 43.6% would yell loud and long if even a small portion of that number of motorists ran a red signal. Let's be fair and face facts. Take any city or town in Indiana, any day of any week, and observe pedestrian movements. You'll marvel at how many the motorist is able to miss. Most of our people do an abominable job of walking. They must be educated, and this education should be largely directed at adults. We shall have to start enforcement against them soon unless they do better.

In addition to school crosswalks and signs, the commission, as its contribution to pedestrian protection, has painted crosswalks at busy intersections, restricted parking to improve sight distance at intersections, provided safety zones, islands, and traffic signals where needed, and, in suburban areas near cities, has constructed sidewalks.

#### SPEED CONTROL

Speed control is an ever-present problem in Indiana cities and towns. In most places, the residents insist on low limits, because, they say, through traffic moves too fast. Drivers, on the other hand, resent what they think is unnecessary delay caused by speed zones in these towns. There must be a compromise between these two points of view. It is hard to get the public to adopt a sane attitude on speed. Men who can't see any point on their own speedometer below 50 when driving, can't think of a number above 20 when demanding signs for their town. Of course, *they* will not drive at 20 in these zones, but they think everyone else should. Much lack of respect for speed zones in the past was occasioned by the practice by local officials of erecting 20 mile signs which meant 30, hoping no one would exceed 40, and starting enforcement at 50.

Our signs arouse local complaint because local people say the limits are too high. However, they are absolute limits and mean what they say, and you may be fined for exceeding the posted limit as much as one mile per hour. Recently, in a small city, we established a 40-mile zone. Almost immediately, local citizens protested that the limit was too high. We suggested enforcement of the 40. The local police made a few arrests, none for speeds less than 50, and were immediately called on by angry business men to stop arresting people and giving the town a bad name.

We always get a complaint when we post a 40-mile limit past a school crossing. Most local people want 20. They forget that our posted zones are effective 24 hours per day, 365 days per year, while school children are crossing the street only two hours per day, 180 days per year. In order to have signs applicable for conditions 360 hours per year, they would have us erect signs ridiculously unsuited for the other 7,800 hours per year. Such signs only increase disrespect for all regulations. We must zone for normal conditions and use special signs or other control devices for abnormal conditions.

There is no doubt that traffic in many of our Indiana cities and towns moves too fast. We cannot, however, create respect for law by continuing a practice that is largely responsible for this condition. Officials of cities and towns where our speed zones have been established tell us they are obeyed remarkably well. This success is due to these facts: (1) Reason-

able limits are posted rather than absurd restrictions. (2) Signs are of suitable design with all changes in zone reflected for night visibility. (3) Intermediate signs are placed about every two or three blocks, instead of depending on one sign at the city limits to control traffic all the way through town. (4) Signs are placed high enough that parked cars do not obscure them. (5) They are properly maintained. Dirty and poorly painted signs create little respect. Our speed zones in cities are determined primarily by the number of people residing in the zoned area, on the theory previously advanced that people create traffic; then other conditions are taken into account.

Despite our efforts, we have many complaints. Near the close of the past year, we zoned a rural highway near Indianapolis through a particularly hazardous intersection for 50 m.p.h. On January 2, a man residing there came in to complain that 50 is too fast. He could cite no accidents since the change, although accidents were frequent there before. He had lived for years near this intersection with unrestricted speed permitted, without complaining, while numerous persons were killed there, but when we attempted restriction, he made a special trip to tell us we were wrong. Certainly a 50-mile limit there is better than no limit, but not to his way of thinking.

Speed control is only partly solved by signs. Some enforcement is also necessary to make the signs effective. Unfortunately, the State Police force is too small to enforce obedience in all towns, and, because of pressure from businessmen, local officers have been prevented from enforcing the law. So, we have a conflict of opinion, one group wanting drastic regulation, another demanding that no effort be made at enforcement. We can't have speed control by listening to either group.

#### TRAFFIC SIGNALS

Traffic signals cause much misunderstanding. There is a widespread belief that signals cure all traffic ills and are the last word in accident prevention. This is not true. They are ineffective unless obedience is enforced, and they cause accidents if installed where not needed. Experience shows that about one in three produce increased accidents or fail to improve conditions. The type of accidents occurring at the intersection has a definite bearing on the question of signalization. Certain types may be reduced; others may be increased. Signals stop, as well as pass, traffic. Stops cause delay, and freedom of movement is reduced about 50% with signals. If they reduce accidents, the matter of delay is relatively unimportant; but since delay *always* occurs, they must be installed only after thorough engineering and traffic investigation.

We are required, by law, to make a traffic and engineering investigation of all traffic signals on state routes and to remove those found to be unnecessary. National traffic bodies have collaborated in establishing a code of minimum warrants for signalization. Since most of the signals in Indiana were erected without previous study, a strict application of this code would eliminate about 90% of all signals on state routes. Believing this to be too drastic, the commission has adopted, for purpose of removal, a code of warrants just half as restrictive as the national code. Even with this relaxation, we estimate that over one third of the signals in place on January 1, 1938, will be found to be unnecessary. However, we believe our position is tenable and that signals at any location not meeting the revised warrants should be removed.

Many of the unnecessary signals stand as evidence to the lack of sales resistance of town boards, to the vanity of small cities, or to local political bargaining. Intrigued and captivated by the brilliant colors and magic movements of these devices, many small cities sought to capture a metropolitan atmosphere by installing them. Many stand as constant reminders of the hard labor and eventual success of some local club in forcing the council to erect them. The usual procedure was to allege that traffic was traveling too fast through the intersection and that there *would be* accidents unless signals were installed. This is a safe argument, for it is a safe bet that *any* intersection, signalized or not, will be the scene of an accident before next Whitsuntide. It isn't, however, a safe bet that signals will prevent them. However, councils are very sensitive to local pressure, and if they demurred, the heat was turned on until success was attained. The signal then became one of the ancient landmarks and was, therefore, inviolate.

In our attempts to remove unnecessary signals, it is surprising to see the value placed on some of these dilapidated and rickety antiques by persons who habitually disregard their warnings. The Sacred Bull and the Holy of Holies pale into insignificance as these worshippers contemplate the ineffable powers of these glorified traffic gadgets. Any attempt to remove them is sacrilege and insult. No one had attempted to determine whether or not they corrected the alleged evil. Everyone *knew* they were the panacea for all traffic ills. This rainbow chasing for traffic cure-alls is not confined to the uneducated, for numbered among our petitioners for new signals or perpetuation of unnecessary ones are teachers, attorneys, ministers, doctors, and others who should know better. The same doctor who ridicules the idea of any medicine being a cure-all for human ills is often an ardent believer in traffic signals as a panacea for traffic ills. They argue that signals work all right in Indianapolis; therefore, they should work better in Podunk, for Podunk has less traffic. They argue that the people want them; therefore, they should be





**Fig. 2. Center pedestal signal showing evidence of vehicle crashes.**

permitted to have them. One could as reasonably argue that people want to use firearms in the street; therefore, they should be permitted to do so.

When you play with traffic signals in modern traffic, you are gambling with human lives. No man or organization has any right, legal or moral, to set up a hazard for his fellow-men. Therefore, signals must be erected or removed according to a definite and carefully worked out plan, if we are to have any semblance of order in our traffic movement. Pressure groups must not be permitted to force installation which facts prove to be detrimental. The universal misconception of traffic-signal benefits and the equally universal belief that petitions with numerous names prove the correctness of arguments cause unnecessary controversy and hamper safety activities.

#### VEHICLE PARKING

It cannot be denied that parked vehicles contribute to accidents and congestion. In business districts, the parked vehicle is almost as great a problem as the moving vehicle. Parking is a privilege and not a right. The primary purpose

of streets is to move traffic rather than to store cars; and the parking privilege must not be extended to the point that it seriously hampers movement. However, the volume of business done and the success or failure of many businesses depend largely on the parking facilities available for their patrons. Thus, we have conflicting interests, with through traffic desiring freedom from the congestion and delay occasioned by parked cars and other traffic desiring a maximum of parking space and a minimum of inconvenience in transacting business. This problem will never be settled to everyone's satisfaction, and any solution must be in the nature of a compromise.

Parking regulations and restrictions must be based on volume and type of traffic, width of streets, speed, demand for parking space, and the time requirements for transacting necessary business. Under certain conditions, long-time parking may be permitted, while under other sets of conditions, parking may be restricted or even prohibited. Vehicles would be of little use if their owners could not park them while transacting necessary business. In congested areas, this privilege must be made available to as many as possible and the early morning parker prevented from usurping the privilege for the entire day. Time limits are, therefore, imposed to provide as many spaces as possible for the public convenience. The tendency toward monopolizing these spaces can only be discouraged by adequate enforcement of these limits. The shorter the time limit, the more cars can be accommodated. However, the limit must be long enough to take care of the time requirements of the drivers. This helps maintain a maximum degree of self-enforcement. Studies in several Indiana cities have been made; and, while conditions vary, we know that about 80% of all vehicles park less than 2 hours in unrestricted zones, for an average of 58 minutes. The other 20% park over 2 hours for an average of nearly 4 hours. Out of each 100 cars, then, 80 cars use less than 80 space hours and 20 cars use about 20 space hours.

With a time limit adequate to meet parking needs, we might reasonably expect to increase the use of the facility so that instead of 100 cars accommodated we could accommodate 160, or an increase of 60%. Merchants, their clerks, professional men, and county officeholders are usually the worst offenders on long-time street storage of cars. It has also become a sort of summertime Hoosier custom in our cities to drive downtown early on Saturday and park the family car all day so that the family will have a reserved seat to watch the crowds or hear the band concert at night. It is a curious fact that while merchants suffer most from the lack of parking facilities for their patrons, they are not only among the worst offenders but also fight hardest against restrictions. They claim that their customers will leave them if any effort is made at regulation.

While long-time parking is not of itself a traffic evil, it causes most of our traffic tie-ups, either by driving persons having legitimate business to double park, or by forcing these persons to drive many additional blocks seeking a parking space. Add it all together and you have congestion, disorderly movement, impatience, horn blowing, and accidents.

Angle parking has been permitted in many states and cities for years, often on streets extremely narrow. At its best, it is a dangerous practice. At its worst, it practically blocks movement. Passenger cars require at least 15 feet of street width for angle parking. The moving traffic will not drive closer than 2 or 3 feet to an angle-parked car. So, we may figure that angle parking on both sides takes up at least 35 feet of street width. When they back out, they require another 15 feet to clear the other vehicles. Thus, a 50-foot street, with cars angle-parked on both sides, is completely blocked during the time a vehicle is unparking. A 60-foot street will have one traffic lane free, unless cars on each side of the street move out simultaneously. Contrast this with parallel parking, which requires only 7 feet for parking and an additional 8 feet for backing in or pulling out. Thus, on a 50-foot street, with a car on each side unparking simultaneously, we still have an unrestricted free way of 20 feet, sufficient for two lanes of moving traffic.

As a compromise between parking and moving cars, we have adopted the following yardstick for measuring street widths for parking restrictions:

Under 30-foot—no parking on either side.

30-foot and under 36-foot—parallel parking on one side only.

36-foot and under 50-foot—parallel parking on both sides.

50-foot and under 60-foot—angle parking on one side, parallel on one side.

60-foot and over—angle parking on both sides.



Fig. 3. Restriction of roadway width by angle parking.

These must, of necessity, not be arbitrary limits, for consideration must also be given to traffic volume, street car lines, and other conditions; but generally speaking, they hold true.

The new Indiana Traffic Code provides other restrictions on parking to keep corners, crosswalks, fire plugs, private drives, and curbs adjacent to safety zones free from parked cars. It also prohibits double parking at any time and angle parking unless spaces are specially marked for it by the responsible street authority. Streets carrying state routes have been marked by the Commission, to show restrictions and outline parking spaces, and signs are erected so the motorist may know the time-limit regulations.

Since taking over these streets on which the Commission now maintains surfaces and provides for street cleaning, snow removal, and necessary signs, it has also contributed the following:

- (a) Parking stalls have been painted in cities.
- (b) Curbs have been painted to provide restrictions on parked vehicles to insure adequate sight distance at intersections, and other parking restrictions marked where needed.
- (c) "Speed," "stop," and other signs have been raised to the 8-foot level to insure against obstruction by parked vehicles.
- (d) Stop obedience-lines have been painted on many streets to supplement signs.
- (e) Hundreds of crosswalks have been painted.
- (f) Speed zones have been determined and limits posted in 383 cities and towns.
- (g) Traffic signals have been maintained, including cost of electric current for operation.



**Fig. 4. Parked trucks obstruct sight distance at intersection.**



Fig. 5. Double-parked vehicles leave only one lane open.

- (h) Forty-seven unnecessary signals have been removed.
- (i) New signals have been erected at 15 locations and signals modernized at 31 locations.
- (j) Many miles of rough streets have been resurfaced to provide safer and more comfortable streets at no cost to owners of abutting property.
- (k) The Commission has painted lane lines, removed obstructions to traffic, changed the angle of parking, rerouted highways, and completely reconstructed and widened some streets.

#### RESULTS

It is safe to say that the Commission has spent more time and money for traffic planning and regulation on our routes in these cities and towns in the past two years than the cities had spent on all their streets in a similar period for the same purpose. In doing this, we have stimulated most of them to greater activity on streets under their control, and the results are apparent. There was a decided decrease of serious accidents in Indiana cities in 1939. The Commission's program and the efforts of all co-operating state and local official agencies, together with those of newspapers and other co-operating outside agencies, are showing results in Indiana. For proof, we have only to look at the record. In 1934, there were in Indiana 28.2 fatalities for each 100 million miles. This has shown a decrease each succeeding year, until in 1939, it reached an unofficial 12 per 100 million miles, less than half the 1934 rate. The proof of the pudding is in the eating.

The Commission is proud of its part in this concerted movement. Every advance has been made by applying scientific principles. Our transportation system is too great and affects too many people to be managed by snap judgment or haphazard guesses. Our greatest need now is for our people to realize that traffic control is a science just as much as disease control, and that such control requires uniformity and planning, rather than special concessions to pressure groups.

The Commission has "gone to town." It has found and solved new problems, and it faces the future confident of its ability to provide greater safety and convenience of movement in Hoosier cities and towns.

## A PROPOSAL FOR MORE UNIFORM SPECIFICATIONS COVERING COUNTY ENGINEERING WORK

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Uniform specifications should be adopted by engineers for county work. I wonder, however, if a uniform plan could be adopted that engineers would adhere to. Generally, specifications are drawn up by an engineer on his own initiative, or he follows the general ideas of a former engineer. But when the state highway specifications are used, you may be assured that the work will be high class, and the bidder need not fear that he cannot compete with others because he knows that these plans and specifications are standard and dependable.

A standard and uniform specification could not be made for all types of work in the various counties of Indiana as there is such great difference in material and in conditions between northern and southern counties. In one section of our county, one may obtain a good grade of gravel, and in other sections, gravel of a desired quality cannot be secured. A flexible specification, however, may be drawn up so that different types of gravel can be used in the road plans. I suppose similar conditions exist in other counties of the state.

In our county, there has been a great change in the work of the surveyors during the past ten years. A decade ago, we were building many miles of gravel, some concrete and black-top roads, and bridges and drains. Our county was very busy in this work and all was let under contract. Today, the county surveyors have no roads and very few bridges to construct, and the ditch work consists, primarily, of clean-outs and tile drain repairs. The road improvement is done by the county road supervisor without specifications. The only road work the county engineer has now is on WPA projects and, of course, they have their forms to follow and the work is uniform.